

## Attachment 4

### *Remediation of Mold-Contaminated Building Materials*

[Adapted from EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001 to apply to All AF Facilities]

#### **Remediation:**

Table 4.1 presents remediation guidelines for building materials that have or are likely to have mold growth. The guidelines in Table 4.1 are designed to protect the health of occupants and cleanup personnel during remediation. These guidelines are based on the area and type of material affected by water damage and/or mold growth. Please note that these are guidelines; some professionals may prefer other cleaning methods.

Remediation activities could be scheduled during off-hours when building occupants are less likely to be affected or remediation activities could be contained in a specific room or area and occupants moved accordingly. Although the level of personal protection suggested in these guidelines is based on the total surface area contaminated and the potential for remediator and/or occupant exposure, contact BE for information on personal protective equipment based on identified hazards and professional judgment. These remediation guidelines are based on the size of the affected area to make it easier for remediators to select appropriate techniques, not on the basis of health effects or research showing there is a specific method appropriate at a certain number of square feet. The guidelines have been designed to help construct a remediation plan. The remediation manager will then use professional judgment and experience to adapt the guidelines to particular situations. When in doubt, caution is advised. Consult an experienced mold remediator for more information.

If building occupants are reporting serious health concerns, they should contact the local MTF for medical care or guidance. Always make sure to protect remediators and building occupants from exposure to potentially hazardous building conditions and materials.

Note: Remove two feet of building materials on both sides of mold-contaminated porous building materials. Chemicals disinfectants should not be used to clean porous building materials in AF facilities; instead, replace porous building materials in accordance with Table 3.1.

#### **Containment Options:**

The purpose of containment during remediation activities is to limit release of mold into the air and surroundings, in order to minimize the exposure of remediators and building occupants to

Table 4.1. AF Policy for Remediating Building Materials with Mold Growth Caused by Clean Water*			
Material or Furnishing Affected	Cleanup Methods**	Minimum Personal Protective Equipment***	Minimum Containment***
SMALL - Total Surface Area Affected Less Than 10 square feet (ft <sup>2</sup> )			
Books and papers	3	N-95 half-face respirator, nitrile gloves, and unventilated goggles	None required
Carpet and backing	1, 3		
Concrete or cinder block	1, 3		
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1, 2, 3		
Non-porous, hard surfaces (plastics, metals)	1, 2, 3		
Upholstered furniture and drapes	1, 3		
Wallboard (drywall and gypsum board)	3		
Wood surfaces	1, 2, 3		
MEDIUM - Total Surface Area Affected Between 10 ft <sup>2</sup> and 100 ft <sup>2</sup>			
Books and papers	3	Limited or Full Consult installation BE due to the potential for remediator exposure and size of contaminated area	Limited Consult installation BE due to the potential for remediator exposure and size of contaminated area
Carpet and backing	1, 3, 4		
Concrete or cinder block	1, 3		
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1, 2, 3		
Non-porous, hard surfaces (plastics, metals)	1, 2, 3		
Upholstered furniture and drapes	1, 3, 4		
Wallboard (drywall and gypsum board)	3, 4		
Wood surfaces	1, 2, 3		
LARGE - Total Surface Area Affected Greater Than 100 ft <sup>2</sup> or Potential for Increased Occupant or Remediator Exposure During Remediation Estimated to be Significant			
Books and papers	3	Full Consult installation BE due to the potential for remediator exposure and size of contaminated area	Full Consult installation BE due to the potential for remediator exposure and size of contaminated area
Carpet and backing	1, 3, 4		
Concrete or cinder block	1, 3		
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1, 2, 3, 4		
Non-porous, hard surfaces (plastics, metals)	1, 2, 3		
Upholstered furniture and drapes	1, 3, 4		
Wallboard (drywall and gypsum board)	3, 4		
Wood surfaces	1, 2, 3, 4		
<b>Notes:</b> * These guidelines are for damage caused by clean water. If you know or suspect that the water source is contaminated with sewage, or chemical or biological pollutants, then the Occupational Safety and Health Administration (OSHA) requires PPE and containment. Installation BEs must oversee removals jobs requiring mold remediation caused by contaminated water.			
** Select method most appropriate to situation. Since molds gradually destroy the things they grow on, if mold growth is not addressed promptly, some items may be damaged such that cleaning will not restore their original appearance. If mold growth is heavy and items are valuable or important, you may wish to consult a restoration/water damage/remediation expert. Please note that these are guidelines; other cleaning methods may be preferred by some professionals.			
*** Consult with the installation BE to determine prudent levels of Personal Protective Equipment and containment for each situation, particularly as the remediation site size increases and the potential for exposure and health effects rises. The BE will assess the need for increased Personal Protective Equipment, if, during the remediation, more extensive contamination is encountered than was expected.			
<b>Cleanup Methods</b>			
•Method 1: Wet vacuum (in the case of porous materials, some mold spores/fragments will remain in the material but will not grow if the material is completely dried). Steam cleaning may be an alternative for carpets and some upholstered furniture.			
•Method 2: Damp-wipe surfaces with plain water or with water and detergent solution (except wood —use wood floor cleaner); scrub as needed.			
•Method 3: High-efficiency particulate air (HEPA) vacuum after the material has been thoroughly dried. Dispose of the contents of the HEPA vacuum in well-sealed plastic bags.			
•Method 4: Discard - Remove water-damaged materials and seal in plastic bags while inside of containment, if present. Dispose of as normal waste. HEPA vacuum area after it is dried.			
Personal Protective Equipment (PPE)			
<b>Personal Protective Equipment</b>			
•Minimum: Gloves, N-95 respirator, goggles/eye protection			
•Limited: Gloves, N-95 respirator or half-face respirator with HEPA filter, disposable overalls, goggles/eye protection			
•Full: Gloves, disposable full body clothing, head gear, foot coverings, full-face respirator with HEPA filter			
<b>Containment</b>			
•Limited: Use polyethylene-sheeting ceiling to floor around affected area with a slit entry and covering flap; maintain area under negative pressure with HEPA filtered fan unit. Block supply and return air vents within containment area.			
•Full: Use two layers of fire-retardant polyethylene sheeting with one airlock chamber. Maintain area under negative pressure with HEPA filtered fan exhausted outside of building. Block supply and return air vents within containment area.			
Table developed from literature and remediation documents including Bioaerosols: Assessment and Control (American Conference of Governmental Industrial Hygienists, 1999) and IICRC S500, Standard and Reference Guide for Professional Water Damage Restoration, (Institute of Inspection, Cleaning and Restoration, 1999)			

mold. Mold and moldy debris should not be allowed to spread to areas in the building beyond the contaminated site. The larger the area of moldy material, the greater the possibility of human exposure and the greater the need for containment. In general, the size of the area helps determine the level of containment. However, a heavy growth of mold in a relatively small area could release more spores than a lighter growth of mold in a relatively large area. The primary object of containment should be to minimize occupant and remediator exposure to mold.

#### *A. Limited Containment*

Limited containment is generally recommended for areas involving between 10 and 100 square feet (ft<sup>2</sup>) of mold contamination. The enclosure around the moldy area should consist of a single layer of 6-mil, fire-retardant polyethylene sheeting. The containment should have a slit entry and covering flap on the outside of the containment area. For small areas, the polyethylene sheeting can be affixed to floors and ceilings with duct tape. For larger areas, a steel or wooden stud frame can be erected and polyethylene sheeting attached to it. All supply and air vents, doors, chases, and risers within the containment area must be sealed with polyethylene sheeting to minimize the migration of contaminants to other parts of the building. Heavy mold growth on ceiling tiles may impact HVAC systems if the space above the ceiling is used as a return air plenum. In this case, containment should be installed from the floor to the ceiling deck, and the filters in the air-handling units serving the affected area must be replaced once remediation is finished. For small, easily contained areas, an exhaust fan ducted to the outdoors can also be used. The surfaces of all objects removed from the containment area should be “wet” cleaned prior to removal. Some remediation activities in limited containments may require the use of a negative air machine or air scrubber to prevent airborne contaminants from migrating throughout the duct system or to other areas of the facility.

#### *B. Full Containment*

Full containment is recommended for the cleanup of mold-contaminated surface areas greater than 100 ft<sup>2</sup> or in any situation in which it appears likely that the occupant space would be further contaminated without full containment. Double layers of polyethylene should be used to create a barrier between the moldy area and other parts of the building. A decontamination room or airlock should be constructed for entry into and exit from the remediation area. The entryways to the airlock from the outside and from the airlock to the main containment area should consist of a slit entry with covering flaps on the outside surface of each slit entry. The chamber should be large enough to hold a waste container and allow a person to put on and remove PPE. All supply and air vents, doors, chases, and risers within the containment area must be sealed with polyethylene sheeting to minimize the migration of contaminants to other parts of the building. The containment area must be maintained under negative pressure relative to surrounding areas. This will ensure that contaminated air does not flow into adjacent areas. This can be done with a HEPA-filtered fan unit exhausted outside of the building. All contaminated PPE, except respirators, should be placed in a sealed bag while in this chamber. Respirators should be worn until remediators are outside the decontamination chamber (e.g., airlock). PPE must be worn throughout the final stages of HEPA vacuuming and damp-wiping of the contained area. PPE must also be worn during HEPA vacuum filter changes or cleanup of the HEPA vacuum. The surfaces of all objects removed from the containment area and the containment area itself should be “wet” cleaned and HEPA vacuumed prior to reoccupancy.